Gadolinium Oxide Paint Formulation Procedure

Materials Needed

1. Jar rolling mill
2. Mill jars
3. Fling pebbles, 5/8" to 3/4" diameter
4. Erlenmeyer flasks with stoppers or equivalent
5. Gadolinium oxide, 95% pure, 325 mesh (Michigan Chemical Co.)
6. Epon 1001 (Shell's solid epoxy resin)
7. Solvents: MIBK, Cellosolve, Xylene, Cyclohexanol, Toluene, Ethyl Alcohol, Butyl Cellosolve
8. Flow Agents: Beetle 216-8 (American Cyanamid Co.)
9. Curing Agent: C-111 (Shell's amine curing agent)
10. Scales or balance and weights

Gd_2O_3 Paint Formulation

			Our Quantities Based On 1200 Grams Total	
Part A	59.0% by weight	Gd_2O_3	708.0 g	
	23.1% by weight	Resin Mixture	277.2 g	(given below)
	10.5% by weight	Thinner	126.0 g	(given below)
	3.7% by weight	Cyclohexanol	44.4 g	
			1155.6 g	
Part B	3.7% by weight	C-111	44.4 g	
			1200.0 g	

Caution: Part B is the curing agent. Do not add until just before using.

DENSITY OF CURED PAINT 2.94 GRAMS/C.C.

Resin Mixture

		Our Quantities Based On 300 Grams Total
51.1% by weight	Epon 1001	153.3 g
16.8% by weight	MIBK	50.4 g
12.1% by weight	Cellosolve	36.3 g
14.8% by weight	Xylene	44.4 g
2.0% by weight	Cyclohexanol	6.0 g
3.2% by weight	Beetle 216-8	9.6 g
		300.0 g

Thinner

		Our Quantities Based On 150 Grams Total
40.0% by weight	MIBK	60.00 g
4.5% by weight	Butyl Cellosolve	6.75 g
45.0% by weight	Toluene	67.50 g
10.5% by weight	Ethyl Alcohol	15.75 g
		150.00 g

Procedure for Mixing

1. Mix the resin mixture first.

   Grind the 1001 into small particles. Add the solvents and shake in a closed container until the 1001 has dissolved. Always store in an air-tight container. A paint shaker works nicely.

2. Mix the thinner. Store in a closed container.

3. Place the formulation in the mill jar. A size O or one-half gallon size jar works fine.

59.0%	Gd_2O_3	-	708.0 g
23.1%	Resin Mixture	-	277.2 g
10.5%	Thinner	-	126.0 g
3.7%	Cyclohexanol	-	44.4 g
			1155.6 g

Caution: At this time do not add the 3.7% of C-111; it is added just before using.

4. Add the appropriate amount of flint pebbles to perform an adequate milling job. One and one-half pounds of pebbles is suitable for a one-half gallon jar and 1155.6 grams of material.

5. Place the mill jar on the jar rolling mill and rotate for 3 days. Our mill rotated at 135 rpm.

6. Remove the jar and strain the contents through cheese cloth and a funnel. Strain into a container and close immediately.

7. Add the C-111 to the milled material and use. You have approximately 8 hours of pot life.

8. An air brush (Model No. W9, Wold Air Brush Mfg. Co.) with 175 g Part A and 6.475 Part B per batch and 30 pounds air pressure works fine to spray the Gd_2O_3 paint.

9. The paint should be allowed to dry a minimum of 5 hours between coats. For a multiple-coat system this will result in some trap solvent which will diffuse out if the paint is to be used in a vacuum. A longer time between coats or an elevated temperature cure between coats would reduce the amount of trap solvent.